the Punta del Este Declaration emphasizes that reciprocity is not required for developing countries, clearly the successful resolution of many of these issues will require some concessions from them. In fact, a number of issues on the agenda--including intellectual property rights, trade in tropical and natural resource products, and various nontariff barriers to trade in goods and services--are predominately conflicts between developed and developing countries as blocs. The first step, then, is for the newly industrializing countries to agree to abide more fully by the basic GATT rules and to enter the Uruguay Round negotiations as peer participants willing to make at least some reciprocal concessions.

Numerous practical problems must be overcome to integrate the more successful developing countries into the GATT system. They must be persuaded to forgo their present privileges as developing countries. It will be necessary to define the point at which a developing country qualifies for the rigor of graduation. Must graduating countries abide immediately by the full force of GATT, or will the rules be applied more leniently to them--possibly in different degree across products or types of policies--with some transitional phase-in period? Should special consideration be provided for those countries that bear particularly vexing foreign debt burdens? Should developing countries be able to shelter infant industries, especially service industries, until they become internationally competitive? How can GATT most effectively target benefits toward the most needy developing countries? Although not all of these issues will be dealt with explicitly in the Uruguay Round, most will arise during negotiations on the many agenda items in which developing countries are important players.

CHAPTER III

HIGH-TECHNOLOGY TRADE

The Uruguay Round is unlikely to see major breakthroughs in high-technology trade, most of which already falls within the scope of GATT. Discussion will focus on reducing the nontariff barriers that hamper trade in this field. U.S. negotiators will emphasize three such barriers: targeting by governments of particular industries for development; restrictions on the access of foreigners to domestic markets; and failure to protect rights to intellectual property such as patents and copyrights.

Targeting is the coordination of government policies to encourage the development of particular industries. This often includes subsidies for research and development, restrictions on government procurement, protection of markets, and restraints on investment. The extent to which governments ought to engage in R&D will require further definition. The European Community's use of substantial R&D subsidies as a development vehicle for its high-technology industries is likely to be a negotiating point.

Restrictions on market access are often used to favor domestic manufacturers of high-technology goods. Technical standards often function as import barriers, as do "buy national" requirements in government procurement. So do laws that restrict investment by requiring a firm to export a certain amount of its output, or to use a certain proportion of local materials. The Uruguay Round will have to strengthen GATT's technical standards and government procurement protocols to resolve these problems. Japan is likely to be pushed to expand access to its markets, while the EC and the United States will be pressed to phase out their restrictions on government procurement.

Intellectual property rights are most often breached by producers in the developing countries, where patent and copyright protection is uneven or nonexistent. A major focus will be on bringing existing intellectual property rights procedures into the GATT and strengthening them.

High-technology manufactures include the following industries, in whole or in part: computers, communications equipment, electronic components, pharmaceuticals, aerospace, and instruments. This list should be considered illustrative rather than exhaustive. 1/

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1. For a detailed discussion of the definition of high technology, see Congressional Budget Office, *Federal Financial Support for High-Technology Industries* (June 1985) and references therein.

High-technology industries tend to be fast-growing and highly productive, qualities that are vital to economic development. Competition in the intensely innovative market environment places a premium on product research and development, as well as on flexible and efficient production techniques. When world markets for high-technology products are expanding, firms from many countries can share in the benefits of large-scale production. When demand slumps, as has been the case recently, the battle for market share intensifies.

CURRENT PROBLEMS IN HIGH-TECHNOLOGY TRADE

The recent deterioration in the trade performance of U.S. high-technology industries has been attributed by many to the policies of foreign governments that seek to aid their industries by stimulating exports or inhibiting imports. U.S. negotiators have made reducing barriers to trade in high-technology products a high priority for the Uruguay Round of negotiations. Unlike trade in agriculture and services, however, high-technology trade does not constitute an easily defined sector. As a consequence, issues related to trade in high-technology products will most likely be addressed under several policy-oriented agenda topics.

Government Policies

Government policies that most critically influence trade in high-technology products can be grouped in three broad categories: the practice of making certain industries the targets of favorable government policies that increase their competitiveness; the creation of nontariff barriers to trade; and the protection of intellectual property rights. Tariffs are not a significant issue in most high-technology product trade, which is already covered by GATT rules for tariffs. But the GATT rules offer weak or in some cases no remedy against targeting and nontariff barriers. In addition, trade in high-technology services, such as computer software services, and the protection of intellectual property rights have never been considered by GATT.

Some countries have entered into international agreements to guide policy in these areas, but there is little consistency overall. Many government policies influencing trade in high-technology products are integrally linked to national development and growth strategies. The underlying question is how far governments can or should go in assisting their strategic industries to become more internationally competitive.

If the Uruguay Round succeeds in strengthening the GATT rules and reducing barriers for high-technology products, U.S. producers should gain on balance. Most important, perhaps, would be the establishment of clear criteria as to what types of government policies are permissible. Given the basic competitiveness of U.S. producers, the United States stands to gain considerably by expanded trade in high-technology products and by better protection of intellectual property rights.

Underlying the entire discussion must be some conception of how new industries are created. Few major industries have arisen in the 20th century without some degree of governmental participation. 2/ As they develop, moreover, high-technology industries offer so much promise for economic growth that governments can ill afford to ignore them. 3/ For these reasons, the development of new industries is unlikely to be a private matter in the future. Some balance must be found between the right of every country to participate in growth and the desire of those already in these developing industries to enjoy the benefits of their past investment.

Recent Trends

Although the United States appears to have a comparative advantage in the production of high-technology goods, the trade surpluses that accompany such advantage have declined significantly--from $27.4 billion in 1980 to $11.7 billion in 1986 (see Table 5). While this performance is clearly better than that of the overall merchandise balance of trade, which declined nearly sixfold over the same period, it largely reflects the high exports of the aerospace industry. As shown in Table 5, the balance of trade for high-technology industries excluding aircraft and parts was in deficit by $1 billion in 1986.

The decline in the high-technology trade balance is primarily the result of increased imports: while high-technology exports grew by 40 percent over the 1980 to 1986 period, imports grew by 105 percent. The greatest import pentration has been in computers and office equipment, elec-

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2. See Richard R. Nelson, ed., *Government and Technical Progress: A Cross-Industry Analysis* (New York: Pergamon Press, 1982).

3. For a discussion of why governments view high-technology industries as central to economic growth, see Congressional Budget Office, *Federal Financial Support for High-Technology Industries* (June 1985), pp. 1-17, and references therein.

TABLE 5. HIGH-TECHNOLOGY BALANCE OF TRADE FOR SELECTED YEARS
(In billions of current dollars)

Industry (Standard Industrial Classification)	1980			1983			1986		
	Exports	Imports	Balance	Exports	Imports	Balance	Exports	Imports	Balance
Drugs (283)	2.0	1.0	1.0	2.6	1.3	1.3	3.1	2.3	0.8
Industrial Organic Chemicals (286)	6.4	2.2	4.2	6.0	2.9	3.1	6.9	4.1	2.8
Computers and Office Equipment (357)	8.7	2.5	6.2	11.7	6.2	5.5	16.1	13.5	2.6
Communications Equipment (366)	2.7	2.5	0.2	3.7	4.5	-0.8	4.3	6.3	-2.0
Electronic Components (367)	6.2	5.3	0.9	7.7	8.0	-0.3	9.2	13.4	-4.2
Aircraft and Parts (372)	14.6	2.7	11.9	14.6	2.6	12.0	18.4	5.7	12.7
Scientific Instruments (380)	7.8	4.8	3.0	8.5	6.1	2.4	9.7	10.7	-1.0
Total	48.4	21.0	27.4	54.8	31.6	23.2	67.8	56.1	11.7

SOURCE: U.S. Department of Commerce, Bureau of the Census.

tronic components, and scientific instruments (SIC 357, 367 and 380, respectively). Imports in these categories, together, rose nearly 300 percent.

If the deterioration of the high-technology trade balance can be partly explained by foreign industrial development policies, most of it seems to be the result of economic factors affecting trade in general. The high-technology balance has not declined as severely as the overall merchandise balance of trade, suggesting that the high value of the dollar and the strength of the U.S. economy should be considered as leading factors. This is not to say that individual trade practices are trivial or should be ignored, but rather to place them in proper perspective.

In recent years, other countries have challenged the virtual monopoly U.S. firms had enjoyed in high-technology markets. At the same time, demand in many of these markets has grown at a slower pace or even contracted. Thus, there are more suppliers than ever in markets that are growing less rapidly than had been expected.

The challengers, while violating many current U.S. sensibilities regarding proper trade policy, see their actions as not essentially different from measures the United States has taken in support of high technology. They ascribe the U.S. lead in this field to its space and military programs. They point out that the federal government has subsidized research and development (R&D) through lucrative defense contracts; that it has guaranteed markets through "Buy America" amendments to procurement legislation; and that on many occasions the government has even provided physical capital to manufacturers of these goods.

The major trade policy issues of concern to the United States in the high-technology areas are well known:

- o Targeting by other governments of industries in which the United States has a technological lead;
- o Restrictions placed on access to overseas markets; and
- o Lack of protection for intellectual property.

These issues have been at the heart of high-technology trade disputes throughout the 1980s. U.S. firms claim that they are excluded from markets abroad, that they are systematically underpriced in the U.S. market, and that their products (which are expensive to research and develop) are copied by foreign manufacturers without appropriate recompense. Moreover, they believe that although U.S. consumers may reap temporary gains from such foreign practices as targeting or dumping, the long-term interests of the U.S. economy are hurt by them.

The prominence of these issues does not mean that the traditional tariff questions have vanished from the agenda. The European Community's tariffs on semiconductors average over 15 percent. U.S. computer tariffs of 4.6 percent offer some level of support for domestic manufacturing, especially at the lower end of the market. In addition, many developing countries have substantial tariffs on high-technology goods. But much progress has been made. The United States and Japan have agreed to reduce their semiconductor tariffs to zero, ahead of GATT's schedule. Nontariff barriers, however, remain much more significant impediments to trade.

TARGETING

Perhaps no issue in high-technology trade is receiving more attention than targeting--which may be defined as the coordinated attempt by a government to direct productive resources to selected domestic industries so as to make the industry more competitive internationally.[4] The intent of the government is paramount, since it is the coordination of many policies that gives targeting its reputed power. Targeting policies have many components. They may include any or all of the following: a protected market; preferential financing; subsidies of various kinds; tax benefits; investment restraints to keep foreigners out; government coordination of R&D; and special treatment of intellectual property rights. The protected market need not include the entire country, although it often does; it may be limited to government procurement, if that constitutes a large fraction of the market. Often preferential financing is available to the targeted industries, although it may be difficult to distinguish targeting from conventional economic development policies. Since high-technology industries characteristically require large R&D investments, assistance in financing R&D is of great benefit. Efforts to break into world markets are costly because the industry is rarely initially competitive and suffers substantial losses. For this reason, governments are often moved to subsidize it, as the European Community has with Airbus. Consumers of high-technology goods may be given tax benefits: for instance, in Japan

4. See International Trade Commission, *Foreign Industrial Targeting and Its Effects on U.S. Industries; Phase I: Japan* (October 1983), p. 17.

purchasers of robots can depreciate them rapidly. Investment restraints may be used to keep foreigners out entirely, as was the case with the Japanese semiconductor industry, or to make them junior partners with domestic capital. Governments often intervene and coordinate decision-making to prevent costly duplication of R&D. This may or may not entail cartelizing the domestic market: Japan has been characterized by government coordination followed by brutal domestic competition. When it is necessary to obtain the requisite technology from abroad, laws or government practices that abrogate or reduce foreign intellectual-property rights (for example, by limiting licensing fees) may be part of the targeting effort.

Brazil's Informatics law provides a clear example of coordination of government policies for the benefit of a chosen industry--in this case, the small and mid-sized computer industry. The Brazilian Informatics strategy has four components. First, it imposes very stringent investment regulations. For example, 70 percent of the ownership and 100 percent of the voting power must be local. Second, the government will deny import licenses to foreign firms producing goods that can be produced locally. In essence, this policy grants local monopolies to Brazilian companies often still in their technological infancy. Third, the foreign access to the administration of this law has thus far been limited. For instance, U.S. companies have complained of unexplained overnight changes in policy that make planning impossible. Fourth, the Brazilian government has placed restrictions on intellectual property rights: software is currently not covered by copyright and the proposed software law has severe deficiencies; other regulations that apply to foreign technology limit both the payments for and the protection of intellectual property.

Japanese Targeting

Some observers of Japan have argued that Japanese targeting is a misunderstood phenomenon. In essence, they say, the government of Japan is trying to use its Ministry of International Trade and Industry (MITI) to compensate for the lack of institutional flexibility enjoyed by U.S. firms. Most Japanese high-technology companies obtain their financing from banks and government finance agencies, which tend to be very conservative, rather than from the equity market. In the United States, when a new technology appears, venture capitalists compete with each other to turn the technology into new products, signaling to the rest of the economy that this is an area of potential rewards. MITI plays an equivalent role in Japan, signaling to bankers and corporations through its "visions," as its plans are called, that it favors certain investments. However, for the most part, U.S.

venture capitalists are quicker in responding than are the MITI bureaucrats. In fact, there is some indication that MITI follows the movements of U.S. venture capitalists as guides for investment strategy. [5]

The cooperative R&D projects sponsored by MITI--the VLSI project earlier, and now the Fifth Generation Project--are similarly misperceived, according to this view. The Japanese educational system, combined with lifetime employment guarantees, produces researchers who are not as well-rounded in their technical background as U.S. personnel in comparable positions. Their primary loyalty is to the firm, not the profession; the movement of personnel among firms, and the informal exchanges that are typical among employees in U.S. high-technology firms, do not occur in Japan. Technological cross-pollinization has been central to U.S. advance. In order to imitate it, MITI has encouraged firms to participate in cooperative research programs. [6]

Another aspect of Japanese targeting that has often been misperceived, according to this view, involves the cost of capital. Targeted sectors are thought to have access to cheap capital, giving them an advantage over foreign firms. But most of the funds available to targeted industries have been available to all major industries; special government funds for targeted industries tend to be small by U.S. standards. The reason for lower capital costs in Japan is that the old system of capital controls gave Japanese households very little choice in deciding what to do with their savings. The result has been a massive transfer of income from households to the corporate sector as a whole rather than to specific industries.

Governmental subsidies to Japanese industry, either through credit or through the tax system, have been relatively small. In both Europe and the United States, subsidy programs are much larger. Moreover, the larger Japanese subsidies go to declining industries. Even in the targeted high-technology industries, the subsidies have often been directed at products

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5. This discussion is largely taken from Gary Saxonhouse, "What is All This About 'Industrial Targeting' in Japan," *World Economy* (September 1983), pp. 253-273. See also Gary Saxonhouse, "The Micro- and Macroeconomics of Foreign Sales to Japan," in William R. Cline, ed., *Trade Policy in the 1980s* (Washington, D.C.: Institute for International Economics, 1983), pp. 259-304.

6. Despite the "success" of Japanese research cooperatives, the evidence for extensive firm participation is not substantial. Japanese firms that participate in government-sponsored research cooperatives can depreciate assets used in this research in one year. In 1982 the cost of this provision of Japanese tax law was only $17 million, suggesting minimal participation. See Saxonhouse, p. 266.

rather than firms. For instance, special depreciation provisions are allowed for purchases of industrial robots--even if the robot purchased is not of Japanese origin. 7/

The principal function of Japanese targeting has been to prevent foreign access to a market until the domestic industry reached the point at which it no longer needed this level of protection. Even here, however, the role of the government should not be overstated. The Japanese government rarely erects formal barriers to trade anymore; its tariff rates on high-technology goods are as low as or lower than those of the United States (see Chapter II), and formal quotas have been abolished in these goods. Whether because of the homogeneous culture or as a result of years of strict government regulation, foreign firms seem to have great difficulty breaking into Japanese markets. Considering the high degree of interfirm competition in Japanese high-technology industries, collusive behavior seems unlikely even though it has been widely reported. Most recently, a MITI official reportedly admitted that efforts to develop a domestic supercomputer industry meant that U.S. companies, which now dominate the world industry, would no longer find buyers in Japan. The report has since been denied, and the official has stated that he merely said U.S. supercomputer companies "need to change their respective philosophies and policies" to compete in Japan. 8/ Subsequently, the government of Japan submitted a plan to the Diet for increasing imports, involving the procurement of $1.0 billion worth of foreign goods--including supercomputers and aircraft--mainly during fiscal year 1987. 9/ Whether this is merely a gesture to diffuse trade frictions or a serious effort to liberalize procurement policy remains to be seen.

Private actors also seem to behave in a discriminatory manner. U.S. semiconductor manufacturers report that their markets dry up as soon as Japanese equivalents to their chips become available. The U.S. independent producers' share of the Japanese semiconductor market has been remarkably constant at around 10 percent--which, given the changing

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7. International Trade Commission, *Foreign Industrial Targeting and its Effects on U.S. Industries, Phase I: Japan* (October 1983), p. 9.

8. Makoto Kuroda, in a letter to the editor of the *Washington Post*, May 23, 1987, p. A21. For the text of the State Department cable on the Japanese official's comments, see the *Washington Post*, April 28, 1987, p. C2.

9. Sally Solo, "Japan Economic Package Seen Raising Imports $5B," *Electronics News*, June 1, 1987, p. 4.

relative positions of the Japanese and U.S. industries, seems more the result of a compact than of the working of free trade. 10/

A final misconception about Japanese targeting is that it always succeeds. Non-Japanese observers who often complain about the ineptness of their own government's policies attribute almost superhuman economic powers to Japan, and especially to MITI. The government of Japan has subsidized the aircraft industry for years, but Japan has not yet become a major force in that industry, although it is becoming important in subcontracting. 11/ On the other hand, the Japanese aircraft industry has been treated differently than other targeted industries in that it is prohibited from exporting many products and has to face competition from firms with protected markets of their own. MITI's failures are best seen in more mature industries such as aluminum, petrochemicals, and shipbuilding. Similarly, many of the Japanese successes in automobiles have come about because their automakers ignored MITI's guidance.

R&D Subsidies

Subsidies for research and development have become an issue in high-technology trade mainly because they are widely used by countries in targeting one or another high-technology industry for preferential development. Whether R&D subsidies are viewed as legitimate depends on the context in which they occur. Most economists (and industry observers) believe that a government has to step in to encourage R&D, especially at the basic level, because if left to its own devices the market is not likely to devote sufficient resources to R&D. 12/ Because other firms can imitate the inventing firm and capture a share of the market and the profits, the benefits from an invention to the inventing firm may be less than the benefits to society as a whole. Consequently firms devote less resources to

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10. The relative shares of Japanese and U.S. semiconductor companies in each country's market is a matter of some contention. Most U.S. industry estimates overstate the Japanese share in the U.S. market by excluding IBM and other companies that produce for internal use. Similarly, they understate the U.S. presence in Japan. See Semiconductor Industry Association, *Japanese Market Barriers in Microelectronics* (June 14, 1985).

11. International Trade Commission, *Foreign Industrial Targeting, and its Effects on U.S. Industry, Phase I: Japan* (October 1983), pp. 126 and 155-163; Aerospace Industries Association of America, *Aerospace Facts and Figures, 1986-1987*, p. 132.

12. See Congressional Budget Office, *Federal Financial Support for High-Technology Industries* (June 1985), pp. 1-3.

inventive activity than the good of society may suggest. The mere act of supporting R&D is not seen as an illegitimate government activity. But the extent to which governments ought to do this, especially when there are international repercussions, is a matter yet to be settled.

Much depends on the kinds of R&D being performed and on how the results are disseminated. Money spent on basic research, or even on generic industrial research, has broad applicability and represents less of a threat to the high-technology industries of competing nations than does an effort to develop a specific high-technology product for export. Similarly, if research results are widely available, questions regarding the propriety of the research effort are less likely to be raised. 13/

Many governments pursue massive R&D subsidy programs in an effort to develop high-technology industries. European countries have joined to support first the Concorde, then Airbus, and now Esprit and Eureka (European Community programs on information technology and on advanced technologies in general); hundreds of millions, if not billions, of dollars have gone into each effort. South Korea is spending hundred of millions to develop a semiconductor industry. Taiwan is also making efforts on behalf of its electronic industries. By contrast, Japanese subsidies are small: the government has concentrated on providing seed money to involve private actors, but the sums have not been large compared with those spent by other countries. In fact, more funds have gone to declining industries and agriculture than to high-technology R&D.

U.S. government agencies also fund large amounts of research for military and other purposes, and this has some relevance for high-technology markets. A recent CBO analysis found that, in 1983, federal agencies spent $8.4 billion on programs to enhance productive capabilities in high-technology industries--not including the large expenditures by the Department of Defense (DoD) and the National Aeronautics and Space Administration (NASA) on R&D for goods being purchased for agency use, such as weapons research, which would obviously add tens of billions to this total. 14/ The

13. The U.S. government has recently begun to move away from giving free access to federally generated technology. The Administration concluded that the reason federal patents were licensed less often than privately generated patents was that the lack of exclusive rights gave private actors no incentive to invest in commercializing federal technology. In response, the Congress passed the Technology Transfer Act of 1986, which permits exclusive licensing under some circumstances.

14. Congressional Budget Office, *Federal Financial Support for High-Technology Industries* (June 1985), p. 31. See subsequent pages in that work for a discussion of the nature and successes of these programs.

purchase of high-technology equipment for the defense and space programs is not done to aid high-technology exports. The government will have to continue funding such research in order to accomplish its military and space missions. At the same time, however, it must be recognized that technological advances are often stimulated by military and space spending. In fact, Japan and the European Community often point to the large amount of U.S. military and space R&D spending in defense of their own programs, which are much smaller. In material describing their R&D programs, they often mention the DoD and NASA as standards to emulate.

Since targeting depends on government intentions, rather than on the amounts spent, any discussion of it must focus on the tactics used by governments to target: nontariff barriers, export subsidies, restrictions on intellectual property rights, and the like. Simply stated, GATT cannot legislate intentions; it can, however, proscribe actions. Although the Uruguay Round is unlikely to produce a protocol on targeting per se, the issue will underlie many specific negotiations--particularly negotiations on strengthening the Tokyo Round codes on subsidies and government procurement and negotiations on intellectual property rights.

ACCESS TO MARKETS

The very nature of high-technology goods often makes trade in them prone to disruption by governments anxious to exclude such imports from the national market. First, a large part of demand is from governments or government-controlled entities, such as the national telephone and telegraph systems, national airlines, defense ministries, and health systems. Second, because many of the products are new, standards of health, safety, and performance may not have been fully developed, and this provides another means of excluding them.

Government Procurement

Broadening the scope and enforcement of GATT's government procurement code, and liberalizing government procurement in general, are of special importance to U.S. high-technology industries. As noted above, governments and government-controlled entities covered by the procurement code buy a disproportionate amount of high-technology equipment, most importantly for their telecommunications systems. On the one hand, the Administration and concerned U.S. firms have been pressing for open procurement processes. On the other hand, exclusive contracts are seen by many industrialized countries as a means of encouraging development of their own high-technology industries, and they may be loathe to relinquish this device.

Another weakness in the U.S. bargaining position on this issue is that U.S. adherence to the covenant has been mixed. Although in passing the Trade Agreements Act of 1979 the Congress implemented the agreement on government procurement and the other protocols negotiated during the Tokyo Round, the United States continues to exclude foreign firms from participating in many government procurement contracts. The code calls for most-favored-nation treatment in this sphere--that is, it requires signatory governments, in making procurement decisions, to grant products originating in any other signatory country treatment no less favorable than that afforded to domestic products or to the products of any other country. The whole procurement process, including the drawing up of specifications, was to become more open. Only military arms purchases and contracts of small amount are exempt from these requirements. 15/ Despite these requirements, the Congress has on several occasions passed laws restricting procurement contracts for such items as highway and mass transit construction materials to U.S. firms. Public works bills since 1979 have also contained Buy America clauses. 16/

At first glance U.S. firms may seem to have more to gain from the procurement agreement than those of other countries, but if the treatment of weapons procurement changes radically, U.S. firms may find themselves challenged in the profitable U.S. military markets for the first time. Currently, exempted weapons procurement plays a large part in U.S. government procurement; of the $99.6 billion the federal government spent on goods of all sorts in 1985, $66.8 billion was spent on the acquisition of military equipment. 17/ Thus two-thirds of U.S. government purchases are exempt from the GATT procurement code. If the next round of talks continues to exempt military equipment, U.S. firms stand to gain. Other nations want to remove this exclusion, however.

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15. Congressional Budget Office, *The Effects of the Tokyo Round of Multilateral Trade Negotiations on the U.S. Economy: An Updated View* (July 1979), p.26.

16. For a list of recent Congressionally-imposed restrictions on government procurement, see Raymond Ahearn and Alfred Reifman, "Trade Policymaking in the Congress," in Robert Baldwin, ed., *Recent Issues and Initiatives in U.S. Trade Policy* (Cambridge, Mass: National Bureau of Economic Research, 1984), pp. 47-49.

17. An additional $13.4 billion was spent on structures.

Change, when it comes, should favor U.S. exporters. In 1984, the European Community spent roughly $10 billion on telephone equipment, and U.S. exports accounted for only $120 million of this.[18] The relatively low sales of U.S. equipment reflect the fact that government procurement regulations tend to dominate these purchase decisions in the EC. Deregulation is reducing the level of government involvement in telecommunications, but progress will be slow. Moreover, the government of West Germany, which controls the largest single market in the EC, is in no hurry to deregulate its telephone system.

Some large U.S. firms are already participating heavily in the EC market, through subsidiaries. The German subsidiaries of U.S. companies produce roughly 20 percent of the equipment for the German telephone monopoly (Deutsche Bundespost). But this limits U.S. participation in the EC market to firms old enough or large enough to have foreign subsidiaries. Many of the relatively small or new telecommunications equipment manufacturers may find themselves excluded from these markets.

Technical Standards

The Tokyo Round also produced a technical standards code, which, much like the government procurement code, obligates signatories not to use technical standards as barriers to trade and to make those standards (and the processes establishing and applying them) more accessible. Technical standards are used most often to impede imports in the pharmaceutical and the telecommunications equipment industries.[19] Some countries have standards that are incompatible with those used by others; in France, for example, the standard for color television is different from that used elsewhere and has permitted the development of a national industry. In other instances, standards are also often set so that their noncritical parameters favor local producers. Exterior dimensions may be used in this way. For instance, West German health standards sometimes specify lengths of electronic keyboards, which do not correspond to lengths used internationally.

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18. The U.S. export figure is slightly understated in that it does not include ground station or microwave equipment.

19. For a more complete discussion of the use of technical standards in restraint of trade, see Robert Cohen, Richard Ferguson, and Michael Oppenheimer, *Nontariff Barriers to High-Technology Trade* (Boulder, Colo.: Westview Press, 1985), pp. 23-31.